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Decision aiding, not dispute resolution: Creating insights through structured environmental decisions

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Abstract (Document Summary)

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[Headnote]
Abstract

Public participation in environmental decisions has become commonplace. A favored model for public input is to use the tools of dispute resolution to seek consensus among members of a multi-party stakeholder group. The authors believe that a focus on dispute resolution and consensus building can pose impediments to the creation of insights for decisionmakers and lead to the adoption of inferior policy choices. Instead, they advocate an alternative approach to stakeholder participation characterized as "decision aiding" through a structured process based on constructive, multi-attribute techniques and value-focused thinking. In this paper some of the major difficulties posed by a dispute-resolution approach are articulated, the principles of a decision-aiding process reviewed, and this alternative approach illustrated

by describing a stakeholder consultation involving water-use planning for a hydroelectric facility on the Alouette River in British Columbia, Canada. © 2001 by the Association for Public Policy Analysis and Management.

INTRODUCTION

Environmental negotiation has become a growth industry. For reasons that range from laudable (such as democratizing resource management) to questionable (such as avoiding responsibility for controversial decisions), many environmental policy initiatives now undergo a review and evaluation process that involves extensive input from and a search for common agreement among a variety of stakeholder interests. The policy contexts range from harvest options in old-growth forests and visibility improvements in national parks to oil-spill contingency plans for sensitive coastlines, regulations for toxics, and standards for cleaning contaminated sites.

Several assumptions lie behind these efforts to achieve negotiated solutions for what until recently have been viewed as technical questions, better left to professional program managers and substantive experts. One assumption is that collaborative stakeholder processes will result in improved solutions, because public and community participants have a better understanding of local concerns and conditions. Another assumption is that open decision processes will more likely lead to the development of alternatives acceptable to community stakeholders (Fiorino, 1990). This 1990s assumption grows from the 1980s frustration characterized by the NIMBY (not in my backyard) phenomenon, which saw numerous well-intentioned plans of government or industry outsiders rudely shot down by frustrated neighborhood and community activists. A merging of these two assumptions leads to a third: Collaborative stakeholder negotiations should seek to build consensus on the key elements of a preferred environmental action. The centrality of this assumption is shown by the near-synonymous interpretation of terms such as "stakeholder participation" and "consensus-building efforts" in recent environmental and public consultation literature.

The authors strongly support the move to democratizing risk and environmental policy decisions, which the National Research Council (NRC, 1996) has described as requiring a combination of analysis and deliberation. The authors also believe that consensus is a desired outcome for multi-party decisions, particularly for complex policy choices. However, they are concerned by the growing emphasis on dispute resolution as the preferred model for public involvement in complex policy agreements, and as the means to achieve consensus among stakeholder groups (McDaniels, Gregory, and Fields, 1999). They believe that focusing on dispute resolution and consensus can, for a variety of reasons, impede the creation of insights for decisionmaking and, in many cases, lead to the adoption of inferior policy choices. In this paper, an alternative approach to stakeholder participation is outlined, one characterized as "decision aiding" through a well-structured decision process.

THE CONVENTIONAL PERSPECTIVE: DISPUTE RESOLUTION TO ACHIEVE CONSENSUS

The basis for much current thinking and practice in environmental management and consultation is drawn from "alternative dispute resolution" (ADR), where negotiated processes are seen as the alternative to the courts. The role played by ADR is particularly strong in the United States, where litigation has become a major industry. This ADR orientation has resulted in environmental consultation being widely seen as a process of resolving conflicts, rather than as one focused on fostering more informed and wise policies. For example, Peelle (1988) defines a successful citizen participation process as one that involves the public in a meaningful way and leads to "any outcome which reduces conflict between stakeholders and agency proponents and results in a legitimate and lasting decision." An extreme version of this viewpoint argues that a stakeholder group should be able to design its own decision process. For example, the Canada National Round Table on the Environment and the Economy (1993) recently set forth a set of principles intended to improve decisionmaking to achieve a sustainable future for Canada. The principles explicitly call for "consensus" in a "self-designed process" involving "all parties with a significant interest" as the prescription for improved decisionmaking. Relying on consensus in a self-designed dispute-resolution process effectively gives every stakeholder participant a veto over the conduct and content of every step in the planning and decision process, as well as a veto over the choice of alternatives.

English and her colleagues (1993) take a somewhat different approach to consensus, focusing instead on the need for a process that encourages understanding of the community and speaks for its (rather than individuals') needs. She advocates "seeking to attain a normative consensus-one in which stakeholders focus on the greater social good rather than simply on their individual stakes" and in which acknowledgment of the social good is not inconsistent with "divergent, passionatelyheld points of view" (English et al., 1993, p. vi). Bleiker and Bleiker (1995) are closer to traditional notions of consensus with their concept of "informed consent," by which they mean that the involved parties are sufficiently comfortable with the selected decision process that they do not use their veto power (whether formal or informal) to block the discussions.

Within this range of viewpoints is widespread endorsement of the notion that consensus is a goal that, while not always attainable, should be striven for and that it provides an indicator of the overall quality of a policy-oriented decision process. In his review of three influential public participation handbooks, Webler (1997) makes a similar observation, noting that despite many differences in the recommended practices agreement is universal that "... consensus should be pursued as a matter of principle." This same sentiment is echoed in the National Research Council's extensive review of the Department of Energy's environmental remediation program, which underscores the importance of consensus among stakeholders and presents its conclusions in a publication entitled Building Consensus through Risk Assessment and Management of the Department of Energy's Environmental Remediation Program (NRC, 1994).

DIFFICULTIES WITH DISPUTE RESOLUTION

Not everyone is fully supportive of the notion of consensus based on dispute resolution. In his review of the recent consensus-based "Enterprise for the Environment" effort, headed by William Ruckelshaus, Coglianese concludes that "Engaging the public in ways that do not aim at consensus can result in many, if not all, of the benefits attributed to consensus-based processes" (Coglianese, 1999, p. 31). Many industries caught in the 1980s NIMBY phenomenon have been openly hostile to the idea of community buy-in for risk cleanup or waste storage, blaming the rules of consensus for higher-than-necessary overall levels of citizen risk. Similar criticisms also have come from environmentalists. When he served as chair of the Sierra Club's Board of Directors, Michael McClosky (1996, p. 34) bemoaned the way in which "small local minorities" could effectively block environmental reform and thereby retain the status quo. He blamed this on a "new dogma" in which stakeholders "make decisions about the environment through consensus rather than through normal governmental processes."

The authors share some of these concerns, but their central criticism of a consensusdriven process is the lack of explicit attention and thoughtful exploration typically given to the values and objectives of participants. The concern is that a focus on consensus can shift, subtly or openly, key elements of the group decisionmaking process. Issues may be selected in such a way that they offer a high potential for agreement, but which results in less tractable issues being ignored. Participants in focus-group sessions, project management committees, or community stakeholder forums may be selected more on the basis of their ability to work well with others than on criteria relating to their diverse range of interests. Methods for impact analyses may be selected to the extent that they are relatively easy to explain and to document rather than on the basis of their ability to answer participants' questions fully or to lend insight to the decisionmaking process. Minority views within a group may be suppressed rather than explored, with conflict among group members being viewed as a problem to overcome, rather than as an opportunity to clarify values and facts relevant to the decision at hand.

Overall, a preoccupation with achieving consensus through dispute resolution has three fundamental shortcomings for environmental decisionmaking. First, government agencies are charged with making decisions that are in the broad public interest within established institutional structures. Yet achieving consensus based on dispute resolution involves creating a new ad hoc institutional structure, outside an electoral process and the usual perspective of majority rule, that instead is based on the unanimous agreement of all participants under circumstances likely to be strongly influenced by personalities. It seems at best awkward, and at worst illegitimate, for a resource-management agency to delegate policy responsibilities to a group of concerned parties who have such direct (albeit often conflicting) interests in the outcomes. This problem is confounded to the extent that many such public involvement processes address local or communitybased environmental issues whereas the funds in question are collected on a state/ province-wide or national basis. As a result, too little emphasis may be placed on the perspective of the general taxpayer or ratepayer.

Second, one of the most robust research findings on decisionmaking is that, left to their own devices, people "systematically violate the principles of rational decisionmaking" (Slovic, Fischhoff, and Lichtenstein, 1976, p. 169). Individuals naturally respond to complex tasks by using their judgmental instincts to find an easy or adequate way through the problem at hand. People respond to probabilistic information or questions involving uncertainties with predictable biases that often ignore or mis-process important information (Kahneman, Slovic, and Tversky, 1982). Moreover, individuals seem to have little instinctive ability to clarify objectives (March, 1978), create a wide variety of alternatives (Keeney, 1992), or structure decision tasks (Simon, 1990). When asked to consider value tradeoffs or to select among alternatives, people often employ heuristic reasoning processes that are susceptible to a variety of contextual or task-related influences (Payne, Bettman, and Johnson, 1993).

In light of these results, decision-aiding approaches take quite a different perspective than conventional dispute-resolution processes on the critical problem-structuring tasks facing stakeholder groups. This difference is due to the foundation of decisionaiding processes in a constructed preference approach (Payne, Bettman, and Johnson, 1992). The constructed preference approach assumes that, in many important policy contexts, stakeholders may hold strong but imprecise opinions so that their specific values and objectives are largely constructed (rather than merely revealed) in the course of deliberations. Thus participants may know that they value environmental protection or economic development, or both, but have little idea how these general beliefs might translate into the selection of a specific management option. As a result, decision-aiding approaches typically spend far more time helping participants identify their relevant values, define them carefully (using measures or attributes), and set priorities among various concerns (Gregory, Lichtenstein, and Slovic, 1993; Hammond, Keeney, and Raiffa, 1999).

In many policy circles, there appears to be a naive assumption that a simple cure for the shortcomings of unaided individual decisionmaking processes is to work with people as a group, thereby ensuring that a wiser choice emerges from the group discussions. Little support for this idea can be found, however, either in theory or experience (Bone, Hey, and Suckling, 1999). A rich body of psychological literature supports the contrary hypothesis, that group participation often encourages people to conform, even if the influence of others leads to erroneous choices (e.g., Allen and Levine, 1968). Policy analysts as well as psychologists have amassed numerous examples of mistakes made by groups of highly competent individuals, from the Bay of Pigs invasion to the Watergate scandal. These examples demonstrate how an unintentional focus on loyalty and maintenance of internal cohesiveness of the group results in a decisionmaking process that fails to explore sufficiently the wisdom of minority views (e.g., Janis, 1982; Russo and Schoemaker, 1989). These findings give little confidence that either self-designed or semi-structured consensus decision processes are likely to develop responsive approaches to clarifying objectives as a means to creating well-informed policy choices.

Third, a dispute-resolution process often emphasizes procedural issues (how the process will be conducted) and largely ignores the definition of the problem, which affects identification of the relevant objectives and, in turn, the alternatives, impacts, and tradeoffs that are evaluated and analyzed. Because of this lack of emphasis on the overall quality of the decisionmaking process and the linkages from objectives to alternatives, consequences, and value tradeoffs, little in most dispute-resolution approaches distinguishes between premature consensus (in which important technical issues or facts are ignored and important differences in values are suppressed) and the real thing. In addition, key issues related to the anticipated outcomes of a decision may be given only minimum attention; examples include understanding the uncertainty associated with alternative consequences, the sensitivity of impact predictions to assumptions about data quality or selection of analyses and models, or clarification of the time dimensions accompanying the costs and benefits of a choice.

Furthermore, when a dispute-resolution process fails to reach consensus, there is a sense that the undertaking has failed. As a result, often relatively little specific information can be drawn on as a responsible basis for making a more informed policy decision or, for the decisionmaker, as a basis for understanding the reactions of diverse stakeholders. The Enterprise for the Environment (E4E) process again provides a good example: Because its leaders could not convince all members of the E4E steering committee to sign the final report, the effort as a whole is widely perceived to have failed. This failure stems in part from the very efforts undertaken to promote consensus. As Coglianese observes in his review of E4E, "Adopting abstract principles and vague standards may serve to secure agreement in the face of conflict, but it constrains the usefulness of the [E4E] report" (Coglianese, 1999, p. 30). And when agreement itself remains elusive, these same purposive efforts to downplay conflict through abstraction may marginalize the conclusions of otherwise ambitious policy initiatives.

AN ALTERNATIVE VIEW: DECISION AIDING TO FOSTER INSIGHT

To remedy these concerns, the authors propose a new approach for reaching environmental decisions in public policy contexts. Instead of resolving disputes, the deliberative process should focus on decision aiding, both for the participants and for the agency empowered to make the decision. Decision aiding means that the process should directly involve the stakeholders in creating a framework that includes the following five key steps:

1) clearly characterizes what matters to stakeholders in the form of objectives

2) creates a set of attractive alternatives

3) employs the best available technical information to characterize effects of the alternatives, including uncertainties

4) identifies the tradeoffs the alternatives entail

5) summarizes the areas of agreement and disagreement and reasons for those views among the stakeholders.

Then, and only then, would a decision-aiding process seek to create broadly supported alternatives that may foster consensus.

Proponents of dispute resolution would perhaps argue that the points above closely resemble elements of a typical dispute-resolution process. Certainly there are some similarities, including a fundamental concern of both the decision-aiding and the dispute-resolution processes with building trust and group cooperation through the open sharing of information, transparency of process, and respect for participants. However, there are four important differences in the two approaches. Taken as a whole, these characteristics clearly set the proposed decision-aiding approach apart from conventional dispute-resolution practices.

Building the Decision Process on Stakeholder Values

The potential for a proposed action to result in beneficial or adverse effects provides the fundamental reason for making any decision and serves as the basis for structuring the elements of a decisionmaking process. Values (or interests) denote what matterswhat is important in the context of the specific decision problem at hand-and are distinguished in the negotiations literature from the positions on which strategically based stands are taken (Sebenius, 1992). Keeney (1992) refers to this emphasis in terms of the need for "value-focused thinking" in individual as well as public policy decisions. Experience suggests that value judgments, in turn, can be used to create more attractive alternatives that stand a better chance of achieving wide support, because they can anticipate and address the concerns of the principal parties involved in an environmental dispute.

The steps in value-focused thinking (VFT) provide the key to designing and implementing the public-involvement process described in this paper. VFT begins by working with stakeholders to identify a small set of objectives that are important in selecting a management alternative. These objectives frequently are displayed in terms of a hierarchy (e.g., a value tree) or in terms of the relationship between end objectives (what really matters in the context of this decision) and means objectives (what matters because of its influence on a more fundamental objective). Next, value-focused thinking looks at the implications of these objectives for the creation of alternatives (Gregory and Keeney, 1994): What options can be constructed to best achieve these objectives? Information on the effects of the alternatives is required, as is information on the tradeoffs among values that guide the selection among alternatives.

Table 1 expands on the five key decision-aiding steps noted earlier and summarizes eight elements of a well-structured decision process (Hammond, Keeney, and Raiffa, 1999). While these elements build on the concepts of decision analysis (Keeney, 1982), they also reflect insights from cognitive psychology, policy analysis, and

behavioral economics. In essence, they serve as a template with which a facilitator can guide group discussions and make effective use of the limited time that can be devoted by a stakeholder group. A key to successful environmental management deliberations is the process of cycling iteratively through these elements, encouraging participants to express and explore their values fully, and then refining the associated information on consequences (impacts) until participants are satisfied that they can make wellinformed judgements about which alternatives they support (Gregory, Keeney, and von Winterfeldt, 1992).

An Informative Decision Rule

Although dispute-resolution processes include a wide variety of alternatives that differ substantially in their sophistication, any approach that strives for unanimous consent effectively gives each stakeholder a veto over the choice among alternatives. In essence, group members are asked: What alternatives can all of you agree on? Here the kind of question differs; it asks individual participants: What alternatives can you support, and why?

This proposed approach is closely related to "approval voting" (vote for all alternatives you can support; Brams and Fishburn, 1983), which in turn is akin to Simon's notion of "satisficing" rather than optimizing in decision contexts (Simon, 1956). The approach offers several advantages as a decision rule for a multi-stakeholder consultation process (McDaniels, 1996):

* It facilitates the identification of concepts, alternatives, and information. In particular, stakeholders need not be concerned that they may inadvertently agree to something early that will prove problematic later.

* Saying "yes" to whatever one believes in is more positive and liberating than worrying about when to say "no."

* Regulators are given more information about the decision to be made, and about stakeholders' preferences, in the event consensus is not reached.

* There are repeated opportunities to explore divergent preferences, refine alternatives, and learn about others' views. For example, stakeholders may find that they agree about a fundamental goal of the decision process even though they may disagree about the means by which it should be achieved.

Once a decision structure is in place, the facilitators' commitment to the group is to report the views expressed and the stated reasons for each. Majority rule is never assumed to be a basis for selecting an alternative. Rather, the nature of support or lack of support for each alternative is reported to the regulator or government agency empowered to make the decision. If complete consensus in support of one alternative can be achieved, the recommendation of the stakeholder group is likely to have more effect on the regulator's decision. If not, the decisionmaker has substantial additional

information about the content and range of stakeholders' views and priorities. This approach is akin to how multi-attribute value elicitation with stakeholders is used in public sector contexts: not as an explicit basis for making a decision, but rather as a decision aid that offers the policymaker insight (Keeney and Raiffa, 1993).

The Role of the Facilitator

In addition to building trust and good communication, the facilitator in a decisionaiding approach provides an overall structure for the decision process. Balancing these roles can be difficult. In dispute-resolution processes, for example, trust is generally built by the facilitator acting as a neutral arbitrator, granting all participants a veto over the structure and content of the deliberations. In decision aiding, the facilitator typically plays a more active, participatory role, in part attributable to the interactive nature of the explicitly constructive process by which values and impacts are pieced together and examined. Trust is built though the process of carefully discovering, disentangling, and structuring the values of participants, showing where the views of participating stakeholders are similar or different and how information about anticipated consequences can help to define the relevant objectives.

This structuring role requires the decision-aiding facilitator to be a skilled analyst as well as a good listener-many of the formal analytical techniques of the decision analyst are brought to the consultation table to encourage dialogue and deliberation. For example, the analyst may help stakeholders to move from vague, qualitative expressions of uncertainty (using words such as "unlikely" or "reasonably probable" to describe impacts) to quantitative expressions (using percentages, probabilities, or frequencies); often a short primer on decisionmaking under uncertainty is required. As another example, stakeholders may spend two or three sessions developing good measures of an objective and (often working with technical experts) defining the range of possible impacts consequent on this attribute. This is detailed and often stressful work but it helps participants to focus only on the objectives that serve to distinguish among the relevant alternatives. As a result, objectives generally central to an individual or a resource management agency may come to be viewed as unimportant for making the particular choice because the objectives will not be affected by the actions under consideration. A variety of techniques, including meansends networks (Keeney, 1992), influence diagrams (Schacter, 1986), and knowledge maps (Howard, 1988), are useful in presenting this mix of values- and facts-based information in ways that are both flexible and easily understandable.

Because value conflicts are at the center of making responsible tradeoffs, it is important for the decision-aiding facilitator to provide an environment in which participants feel they can speak freely and to evoke emotions as well as logical thought. Recent findings in judgment and choice research acknowledge the importance of affect-the feeling states people experience, such as happiness or sadness, as well as qualities associated with a stimulus, such as goodness or badness-as a key element in how individuals form judgments and make decisions (Damasio, 1994; Zajonc, 1980). A structured approach facilitates the incorporation of

emotion into stakeholders' deliberations. A structured approach would include developing improved alternatives based on tradeoff analysis, through the construction of scales (e.g., indices for emotions including anger, pride, or outrage as well as scales for moral or ethical concerns) and through the recognition of their source in the specific problem context. Explicitly allowing affective responses into environmental deliberations is a necessary component of trust-building and, in addition, often serves as a catalyst to help participants define their values more fully and to create improved alternatives.

The Role of Adaptive Learning

Generally a dispute-resolution process is considered successful if an agreement is reached. Yet most environmental policy choices are intended to lead to a new state of the world and therefore are fraught with uncertainty. This can, and should, leave stakeholders (and regulators) dubious about supporting any inflexible alternative because future research and experience may turn up unforeseen information and suggest that the impacts are far different than expected. Hence, decision aiding should involve some type of institutional design that allows for monitoring, adjustment, and adaptive learning over time as well as the possibility of revisiting a policy decision if circumstances require it. Ideally, this should be done without running the risk of unraveling a difficult-to-piece-together decision.

Holling (1978), Walters (1986), and others developed adaptive management as a means of coping with such profound uncertainties in managing complex natural resource systems. It can be characterized as an approach that explicitly recognizes uncertainties (in the underlying science, in ecosystem and human reactions, or in the realization of both short- and long-term consequences) and, in response, suggests that multiple approaches be tried on a small (i.e., reversible) scale. It may also suggest that their results be closely monitored to maximize learning (what worked? what didn't?) while minimizing the occurrence of costly failures. Adaptive management therefore defines decisionmaking as an iterative process rather than as a one-time exercise and uses both formal experimental designs and informal processes to provide opportunities to learn over time.

AN EXAMPLE OF DECISION AIDING: THE ALOUETTE RIVER STAKEHOLDER COMMITTEE

British Columbia, in western Canada, has a long history of producing electricity from hydroelectric dams. Although the dams were widely viewed as instruments of social progress and economic development in the 1960s, increased concern about the health of the environment has prompted many provincial residents to question the current balance between electricity generation and environmental preservation. As with many rivers in the western United States, issues relating to the protection of salmonid stocks are central to this debate.

In autumn of 1995, the provincial electrical utility, British Columbia Hydro and Power

Authority (BC Hydro), asked two of us (Gregory and McDaniels) to guide a process that would contribute to a new operating plan for managing water flow in the South Alouette River in southwestern British Columbia. The third author (Fields) coordinated the activities of BC Hydro on the project and joined in designing the decision process. A total of 15 official meetings, averaging about three hours each, occurred over a six-month period from January to July 1996.

The immediate regulatory objective was to meet the directive of the British Columbia Water Comptroller (the provincial regulator of water use) to consult with specific groups of stakeholders in developing a water management plan for the South Alouette River. A second objective was to address local concerns over fisheries and flood-control issuessources of controversy for decades-in a meaningful and efficient manner. A third, broader objective was to develop and test a process on the Alouette River that might serve as a model for subsequent multiparty environmental consultations in the province.

Identifying Objectives

The Alouette Stakeholder Committee (ASC) had 17 official members, drawn from a wide array of interested groups and organizations including local residents, provincial and federal government agencies, First Nations (i.e., Native Americans), BC Hydro, and other key user groups. Initial information suggesting possible objectives for Alouette facility water management came from structured discussions with these persons as well as interviews with more than 20 key community and government leaders. These talks led to a preliminary set of four objectives (in no particular order) for an improved operating plan:

* Avoid adverse effects from flooding.

* Promote recreational activities.

* Promote the health and biological productivity of the South Alouette River and the upstream Alouette Lake (including fisheries).

* Avoid cost increases to provincial residents.

The early ASC discussions of these objectives revealed that something was missing: Members were concerned about the level of uncertainty regarding fisheries ecology and management on the Alouette River (for example, the relationships between water flow, velocity, and fisheries productivity). As a result, a fifth objective was added to the list:

* Promote flexibility, learning, and adaptive management for the Alouette system.

Table 2 presents this set of structured objectives. The overall objective is to select the best management plan for the Alouette facility. Sub-objectives specify the

characteristics of the best plan, assuming no constraints or limits on what could be achieved. In practice, it is unlikely that any single alternative could fully achieve all these objectives because several of them conflict, as is typical in public policy issues. Thus, to clarify what the best possible alternative would entail, tradeoffs among the objectives must be considered.

Creating Alternatives

Stakeholders' expressed values were used as the building blocks to construct a wide range of alternatives designed to satisfy each objective. It was recognized that these alternatives would necessarily involve tradeoffs among objectives, such as balancing increased water flow (to assist fish populations) with the costs of foregone power production. So ASC members could understand how the tradeoffs changed among alternatives, a wide range of possible alternatives was identified, involving different levels and types of tradeoffs. These discussions often first considered alternatives (and their costs) to achieve one objective and then moved on to examine how these separate alternatives could be combined into various plans. Information about the results of the alternatives was communicated using "consequence tables" (Hammond, Keeney, and Raiffa, 1999), which involve constructing a matrix showing the relevant objectives (and measures) in rows along one side and the relevant alternatives in columns across the top. The cells in the matrix thus contain information characterizing how well a given alternative will perform in terms of each objective.

The basis of comparison in evaluating alternatives generally focused on whether the benefits from non-power objectives justified the potential reduction in power output (and increases in cost) associated with adopting a component of the plan that did not maximize electrical generation from the facilities. The ASC discussions recognized that maintaining an assured supply of electrical power should be consistent with the multiple uses of water from the Alouette system as well as future treaty agreements with First Nations. In addition, it was recognized that all elements of a proposed operating plan should be evaluated as part of a package that included nonmonetary benefits and costs (e.g., the recreational benefits of improved angling opportunities) as well as monetary benefits and costs (e.g., the foregone power costs).

Understanding Impacts

One key facilitation task was to assist in identifying gaps in the information base viewed as critical for informed decisionmaking. These gaps ranged from questions about the system operating procedures employed by BC Hydro engineers, to predictions about the effects of alternative flows on fish populations. The mid-sequence ASC meetings devoted considerable time to presentations from technical specialists, many of whom conducted substantial research and modeling efforts to provide directly relevant information. For example, BC Hydro staff conducted extensive simulation modeling about flood control and power production, considering a wide range of possible operating scenarios (McDaniels, Gregory, and Fields, 1999). Several meetings of the ASC were devoted to ensuring that committee members

understood and were comfortable with the approach taken on simulation modeling for flood control and power production.

Assessing Tradeoffs

ASC members considered operating plan alternatives constructed on the basis of the five key objectives listed in Table 2. In each case, the ASC worked to select alternatives and achieve agreement on a single component of the plan (one that would achieve the desired outcome for the objective under consideration) while recognizing effects on other considerations. When agreement among ASC members was not possible, participants were asked to designate their preferred component of a plan from among a small set of alternatives, and to discuss their reasons for this choice based on their values and knowledge of the pros and cons of the options.

One key decision concerned how tradeoffs would be considered and articulated by the committee. Three approaches were considered:

* Express tradeoffs in dollar terms, based on willingness-to-pay concepts.

* Consider tradeoffs in terms of quantitative scores derived from a full multiattribute utility (MAUT) analysis.

* Express tradeoffs by determining the (qualitative or quantitative) pros and cons of alternatives, distinguishing between clear winners or losers and those options requiring further analysis.

After discussion, the committee formally adopted the third approach, recognizing that the required background research and introspection were also essential first steps in responsibly completing either of the first two. Thus, the "balance pros and cons" approach could be followed by further (economic or MAUT) analysis but only if it were needed to lend insight to specific decisions regarding the selection of preferred alternatives.

Consultation Summary

This deliberative process resulted in a detailed record of the ASC's reasoning with respect to the development of recommended operating plan alternatives based on the five specified objectives. Benefits and costs of the recommended actions were shown for each objective along with the committee's decision to either adopt or reject a recommended component (e.g., the decision to approve increased protection from major flood events, improved from the current 1-in-12 years to 1-in-32 years, at an average annual cost of approximately $30,000). For the Alouette River consultations, all of these recommendations were unanimous, resulting in a consensus recommendation for a single preferred alternative. In cases in which participants strongly disagree among themselves, the same presentation format could be used to record a variety of opinions about multiple actions and alternatives and to explain

these views, thereby granting the decisionmaker maximum insight.

DISCUSSION

The Alouette River decision-aiding process exemplifies the type of analyticdeliberative approach to dealing with risk problems that the National Research Council (1996) has called for. The structured, decision-aiding approach used in the Alouette River study also exemplifies a successful multiparty negotiation (using this term broadly), in the sense that each of several interests worked together to fashion a complex, integrative agreement (Bazerman, Magliozzi, and Neale, 1985). The following four steps describe elements of this decision-aiding approach that were particularly important in providing a structure within which a successful agreement could be constructed.

Making Use of Stakeholder Input

Multiparty decision processes nearly always ask for stakeholder input, generally in the form of discussions among committee members or citizen representatives about the pros and cons of alternatives. Yet, in most instances, it is difficult or impossible for stakeholders to trace the path of their input or to document its influence on the selection of alternatives by resource managers. In the Alouette River case, great care was taken to ensure that stakeholders' input would be transparent and easily traced. One example is the development of the five explicit objectives, created by the ASC and readily available throughout the process to serve as a gauge against which each alternative could be assessed and held accountable. Another example is the high level of information given the committee through presentations from outside technical experts. In addition to these content considerations, the ASC members provided direct input on the decision process to be followed in the meetings as well as related considerations, such as the extent of participation by the facilitators and the scope, timing, and circulation of draft reports based on committee discussions.

Exploring Differences among Participants: Values and Affect

The diversity of interests and technical background among ASC members was profound. Several members were highly trained experts with extensive expertise in matters of electrical power generation and fisheries production, whereas other members had little or no previous experience with this type of discussion. In addition, members represented local environmental groups, business interests, and homeowners, with objectives ranging from very specific concerns (e.g., effects on streambank stability in particular locations) to general issues of equity, trust, and the sharing of decisionmaking power among participating parties. This diversity led to a wide range of values and considerations, and an important part of the task was to first get committee members to express these values and then move from the relatively intransigent positions of some group members to a more flexible stance based on recognition of the associated values and interests (Fisher, Ury, and Patton, 1991).

Analytical techniques, such as means-ends networks and objectives-by-alternatives

consequence tables, were used extensively to clarify how changes in the expressed importance of objectives could be translated into the selection of a preferred alternative. In addition, the stakeholder deliberations brought forth a surprising depth of emotional response: impassioned speeches, fierce arguments, and (on one occasion) the threat of a physical fight. Many of these responses can be appreciated in hindsight as natural outgrowths of the nearly 50-year battle some local residents had waged to obtain changes in the operating plan of the Alouette River dam. As a result, several times it was necessary to add extra presentations by community-based experts or First Nation representatives to ensure that the committee's deliberations effectively embraced their affective and cognitive concerns.

Identifying and Refining Acceptable Alternatives

The participants' values serve a primary role in the creation of operating-plan alternatives and the ways in which elements of the overall plan were constructed, piece by piece, in response to these considerations. For example, after considering tradeoffs with the "avoid cost increases" objective, the ASC decided to include flushing flows (brief periods of higher-than-normal water flow, which help to clean the river) in all alternatives. This sequence can be contrasted with that of a typical benefit-cost analysis, in which alternatives are considered first (an example, using parallel language, of what could be termed "alternatives-focused" thinking) and priced out, often on the basis of lengthy and expensive studies. Because the anticipated benefits of flushing flows were clearly very large (in terms of increased biological productivity of the river) and the costs were relatively small (on the order of $30,000 to $40,000 per year), refinement of the estimates was considered to be a waste of project resources.

Another key consideration in developing alternatives is understanding the cognitive heuristics participants employ. If left unchallenged, many of these mental processes can undermine facilitators' efforts to create viable options. One example is the wellknown "fixed-pie" bias, which leads to the perception that the interests of two parties are directly opposed: They win; we lose. The facilitator's role in such cases is to search the relevant set of values for a key to joint gains (Bazerman and Neale, 1992). For example, an improvement in local recreational opportunities on the Alouette River might come at the expense of power production (a win-lose situation), but by casting a wider net and including improvements in community goodwill as an objective of BC Hydro, the groundwork was laid for a possible agreement (i.e., expanding the pie to provide additional opportunities for tradeoffs and to create a win-win context for discussions; see Thompson and Gonzalez, 1996). Another example is the anchoring bias, where an unrealistic reference point established at the start of the process could block later attempts to create a broadly acceptable alternative. A useful approach in such cases is to remind participants of the default case: What is likely to happen if no agreement is reached. In the Alouette case, a key stakeholder who anchored on a very high flow rate for the river (thought to be optimal for salmonid populations) was persuaded to accept a lower (and more broadly acceptable) rate only when reminded that, if no agreement were reached, the present low levels of water flow would continue indefinitely. In effect, the discussion of the default case introduced a second

anchor and helped move this participant to a more flexible position.

Incorporating Learning over Time

The Alouette River dam had been operating at relatively low flow rates (20 cubic feet per second) for a long period preceding the start of these operating-plan discussions. Several of the alternatives under consideration involved average rates of flow that were three, five, or seven times this high, and the plan the ASC eventually recommended called for average flow rates of about 100 cubic feet per second. Although the evidence on impacts generally pointed to this alternative as the best, it also was clear that the lack of previous operating experience at this level created substantial uncertainty regarding its possible effects. As a result, adjustments might be necessary at some future time based on the experience gained with this alternative in terms of its ability to meet fisheries and (to a lesser extent) flood or recreational objectives.

Reducing uncertainty by encouraging learning over time represents an important part of the ASC recommendations. Much has been written in the consultation and negotiations literature about the value of discussing difficult aspects of a possible agreement in an atmosphere of non-commitment. Fisher, Ury, and Patton (1991), for example, write about avoiding the inhibiting effect of worrying that every option discussed may be heard as a commitment. In environmental management contexts such as the Alouette River, this concern arises because of the need to reach an acceptable, long-term agreement under conditions where ecological uncertainty is often very high. Thus, all sides were encouraged to recognize that any agreement may have to be changed in the future after experience with a new set of environmental conditions. Furthermore, quick additions to the present level of knowledge (e.g., a pause in negotiations to conduct a six-week study) were unlikely to be sufficient. The need therefore existed for reaching agreement on an ongoing, formal mechanism that would incorporate learning over time. The creation of the five-person Management Committee, empowered to conduct further studies and (if needed) to refine water flows over time, solved these problems for the ASC and provided a means for incorporating flexibility into the recommendations that were passed along to BC Hydro and, in turn, to the Provincial Water Comptroller.

CONCLUSION

The basic reasoning is straightforward: If consensus is the primary goal of an environmental deliberation among stakeholders, then facilitators may shy away from the hard work necessary to understand participants' concerns and the reasons for value differences among group members so as not to jeopardize the potential for agreement. The authors take nearly the opposite view, arguing in this paper that it is important to explore stakeholders' values fully as a first step in any environmental policy process. Furthermore, we believe that differences in the expressed values and objectives of participants should be welcomed and investigated carefully because these differences often will serve as the building blocks for reaching broadly

acceptable agreements. Not all elements of these agreements require the support of all participants, and not all participants have to favor the same alternative. Instead, all stakeholders have to see enough of their values reflected in the same alternative that they will consent to lend it their support (Gregory, 2000).

Was the Alouette River decision-aiding process successful? The authors think so and suggest that this success extends well beyond the fact that an agreement was reached among all members of the ASC. The discussions resulted in an improved understanding of participants' values and in significant improvements in the quality of the available technical (scientific) information. The extensive process of deliberation and analysis encouraged by the decision-aiding approach led to an agreement made by an informed committee, composed of broadly representative stakeholders. A mechanism for incorporating learning over time was built into the agreement, thus providing a basis for optimism regarding the longevity of the new operating regime. BC Hydro upheld the ASC agreement and, on the basis of this strong support, swiftly implemented it following approval by the Provincial Water Comptroller. In addition, a precedent has been set in that the provincial government has approved a provincewide water-use planning process, closely based on the Alouette River decision-aiding approach and designed to cover all other hydroelectric sites within the province.

One other measure of success is the support and clear enthusiasm of stakeholders for the decision-aiding approach. Although the value clarification and tradeoffs parts of the structured group discussion can be very demanding, ASC participants expressed enthusiasm for exploring their own values and for learning-in some depth-about the parallel or divergent views of their peers. As in other structured decision processes, many participants wanted to keep the process going to deal with other community and regional environmental issues. In particular, feedback from ASC members stressed the attractiveness of a deliberative process focused on tradeoffs among objectives and provision of factual information about consequences, tied to expressed values. Participants enjoyed becoming better informed about both their values and the associated facts and were reluctant to acknowledge the externally imposed deadlines requiring a decision and the end of deliberations.

The overall objective of a decision-aiding approach is to provide policymakers with improved insights about the policy decision to be made. In the Alouette River example, deliberation among participating stakeholders focused on creating an insightful framework for characterizing the decision. Discussions also identified areas of agreement and disagreement about participants' values and their views regarding possible project consequences. This contrasts with the primary objective of dispute resolution, which is to resolve disagreement among diverse stakeholder interests. Consensus can be an outcome of a decision-aiding approach (perhaps more readily than with dispute resolution), but the process is resilient: If consensus is not achieved, the main objective of providing insight about the decision is still accomplished.

[Sidebar]

[Sidebar]
Table 1. Elements of a well-structured decision process.
1. Define the decision problem to be addressed.
2. Identify key objectives to clarify what you want your decision to achieve.
3. Define a rich set of alternatives.
4. Describe consequences in terms of how each alternative meets the objectives.
5. Focus on the tough tradeoffs that exist across objectives.
6. Define how uncertainty affects your decision.
7. Pay close attention to cognitive and emotional traps that could inadvertently bias your choices.
8. Examine how the outcome of this decision will influence future decisions.
Based on Hammond, Keeney, and Raiffa, 1999.

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